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Claims 8-9 and 12-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz U.S. Patent No. 5,620,776 (hereinafter "Schultz").

In regard to the Examiner's comments in the first Office Action, it is Applicant's understanding that the Examiner has:

- 1) Rejected Claims 8-9 and 12-13, citing U.S. 5,620,776 Schultz as teaching the use of:
 - a) Very small embossing elements (0.003"-0.120"),
 - b) on a small percentage of the tissue,
 - c) resulting in a minority of fiber to fiber bonds being broken.

With respect to Schultz, Applicant is familiar with the embossing pattern which is the subject of the Schultz patent from work Applicant performed empirically on bath tissue in 1997-1998. Applicant does not consider Schultz to be related to the present case because of the following reasoning.

Schultz is easily visible to the unaided eye. The Schultz product is at least an order of magnitude larger in scale than the softening pattern in the present invention of the instant U.S. Patent Application.

The embossing pattern disclosed in Schultz is focused on significantly increasing the visual appeal and bulk (z-direction thickness) of the embossed tissue. Any increase in softness in

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Schultz was an ancillary benefit. By contrast, the present invention is focused on increasing the softness of the embossed tissue, and significant increase in visual appeal or bulk attributable due to the decorative embossing pattern.

The embossing pattern disclosed in Schultz is focused further on the visible icons which cover a small percentage of the product surface area, and a method to improve their visibility. By contrast, the present invention is focused on the entire product surface area, or the area between the icons.

Schultz is focused on producing a tissue with "signature bosses" and speaks extensively to methods of producing these bosses such that they will have good clarity. A number of references throughout the document plainly indicate that the bosses in question are intended to enhance the visual appearance of the embossed tissue sheet. They must therefore be visible to the unaided human eye.

The Schultz disclosure, at Col. 1, lines 14-15, indicates that the Schultz invention requires the finished embossed sheet to exhibit "high bulk and good emboss pattern definition."

The Schultz disclosure, at Col. 4, lines 10-13, states that "Signature bosses may be made up of any emboss design and are often a design which is related by consumer perception to the particular manufacturer of the tissue."

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The Schultz disclosure, at Col. 5, lines 62-65, further states that "The signature bosses enhance the puffy or filled appearance of the sheet both by creating the illusion of shading as well as by creating actual shading due to displacement of the sheet."

The size of the bosses used in the Schultz examples cited, as well as their distribution and area coverage, can all be determined from the dimensioned figures shown in the patent.

The Schultz Figures 2, 4, 5, and 8 show that the bosses disclosed were envisioned to have a height of 0.060".

The Schultz Figures 1, 3, 6, and 7 show the bosses being arranged in a large array so as to present a visually distinct appearance.

The Schultz Figures 13 and 14 show photographs of tissue sheets made with these arrays which are plainly visible to the unaided human eye.

Schultz also is focused on increasing the bulk of the tissue. By contrast, the present invention does not significantly increase the bulk of the tissue sheet unless combined with the optional icon embossments.

The Schultz disclosure, at Col. 1, lines 60-62, states that the Schultz invention "provides an embossed paper product which is significantly higher in bulk than prior art products."

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The Schultz patent disclosure, at Col. 4, lines 66-67, states that the Schultz "invention is a paper product having improved bulk and superior pattern definition characteristics".

These citations show that Schultz was directed specifically toward production of a high bulk, visually distinct tissue sheet through the use of bosses which are easily visible to the unaided human eye. A side effect of this direction was to limit severely the percentage of the sheet which is covered by the bosses so that there is plenty of white space around them to provide visual contrast.

This is in contrast to the present invention, which has been specifically directed toward production of a softer tissue sheet through the use of bosses which are so small as to be invisible to the unaided human eye and cover a large percentage of the tissue sheet. The following table contains a comparison of the major features of these two cases.

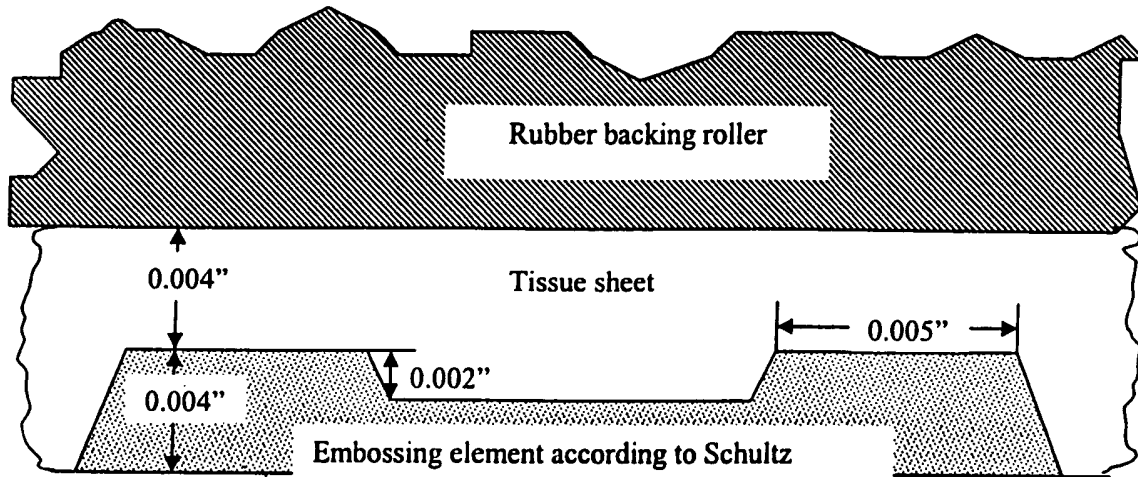
Present Invention	5,620,776	Schultz
Embossing element height (range claimed)	0.0 - 0.1 mm	0.076 - 3.048 mm
Embossing element height (range used)	0.0 - 0.1 mm	0.381 - 1.524 mm
Embossed area (useable range)	85 - 100%	0 - 15%
Visible signature bosses	Optional	Required
Invisible softening bosses	Required	Not mentioned
Pattern of bosses	Any	Regimented

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Notwithstanding the Examiner's statement in the last line of paragraph 3, nowhere in Schultz does it state that the roll produces invisible depressions in the tissue. Following two thorough readings of the Schultz document, Applicant finds no instance of the word "invisible," nor do any phrases indicate that any part of the embossments are invisible to the unaided human eye.

An embossing pattern may be engraved to any desired depth. In order to be visible to the unaided human eye, i.e., to achieve the goal of a visually attractive and distinctive design, an embossing pattern must be engraved to a depth at least as great as the thickness of the paper to be embossed. For example, tissue is commonly about 0.008" thick. More commonly, the depth of engraving is at least four (4) times the thickness of the paper to be embossed. Most commonly, the depth of engraving is five to seven (5 to 7) times the thickness of the paper to be embossed. Thus, it is plain that in the Examiner's citation (Col. 2, lines 5-24), Schultz has chosen a range of engraving depths that was convenient rather than functional. Assuming that the embossing pattern described in Schultz were to be engraved according to the description and with an engraving depth of 0.1 mm, approximately 0.004", or $\frac{1}{2}$ the thickness of a common tissue

sheet, a side view of the engraved roller as it contacted the sheet would then be dimensioned as below:



This drawing illustrates the point at which the present invention contrasts to Schultz. In light of the preceding discussion, an embossing roller constructed and operated according to the above drawing will not result in a tissue product exhibiting "high bulk and good emboss pattern definition" (Schultz Col. 1, lines 14-15). Nor will it result in a tissue product exhibiting "puffiness and bulk" (Schultz Col. 11, line 58, and Col. 13, line 16). A roller constructed according to Schultz in the embossing height region where our claims overlap would not in fact result in the benefits claimed by Schultz

It is conceivable that one might use a roller engraved in this manner to produce the effect of the present invention to a lesser degree. However, Schultz neither claims, nor discloses this effect. Since the embossing pattern disclosed in Schultz

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covers approximately 10% of the tissue surface vs. the 100% claimed for the present invention, it would be expected to produce approximately 0.10 of the effect of the present invention. A softness increase of such reduced magnitude would not be measurable at a statistically significant level utilizing the test methods described in the instant application.

For the foregoing reasons, the rejection of Claims 8-9 and 12-13 under 35 U.S.C. §103(a) as unpatentable over Schultz U.S. Patent No. 5,620,776 is based on an insufficient reference and is respectfully requested to be withdrawn.

Claims 10-11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Schultz in view of Rheingold U.S. Patent No. 3,563,819 (hereinafter "Rheingold").

The Examiner has rejected Claims 10-11, citing U.S. 3,563,819 Rheingold et al. in combination with U.S. 5,620,776 Schultz, to make a finding of obvious to:

- a) Use etching or stippling to create an embossing roll which would
- b) result in a product with a minority of fiber to fiber bonds being broken.

With respect to Rheingold, the Examiner's rejection of Claims 10-1 using Schultz in combination with Rheingold is subject to the deficiencies of the Schultz reference as discussed

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in respect to the Schultz patent herein above. Reingold further is an insufficient reference for the following reasoning:

Rheingold is focused on a method for cutting parts out of thin metal.

The Rheingold disclosure, at Col. 3, lines 70-72, states that "it is an object of the present invention to provide a mechanochemical sheet metal blanking system."

The Rheingold disclosure, at Col. 6, lines 44-45, indicates that Rheingold considers the metal to be thick if it is "0.015 inch or thicker."

The Rheingold disclosure, at Col. 7, lines 22-33, states that an advantage of the system described is that "extremely complex shapes can be cut in very thin ductile sheet metal."

The Rheingold disclosure, at Col. 7, lines 51-53, confirms this when it states "Only thin stock is employed, varying from 0.003 inch to 0.06 inch. A preferred range is 0.003 inch to 0.025 inch." By contrast, the present invention is focused on a method for roughening the surface of a steel roller. The tube walls of said roller are at least 1 inch thick, and generally range between 2 and 3 inches thick. The roller may also be made of a solid steel shaft.

Further, Rheingold speaks to chemical etching as a means of obtaining a specified part from a sheet of similar material.

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The only mention of etching is in reference to its' use as a means to separate a relatively large partially punched part from the parent stock of metal.

Rheingold makes no mention of chemical etching as a means of achieving a specified surface finish on the metal, that being the purpose of etching as used in Claim 10 of the present invention.

The Rheingold disclosure, at Col. 5, lines 71-72, states that "there is a definite line (crack) of peripheral division between the part and stock." Also the Rheingold disclosure at Col. 9, lines 46-47, "For the remaining thickness of the part and stock a fracture (crack) surrounds the part." Therefore, the punching operation must be construed as having mechanically broken a portion of metal in the shape of the desired part partially free of the remaining metal stock.

By contrast, the action of mechanically stippling, i.e., striking with a punch or other means to create a dimple or crater in the surface of the metal stock an embossing roller for the present invention does not create a crack between the portion which has been struck and the remainder of the metal stock, and operates without removing a significant portion of the metal stock while creating any given dimple.

Rheingold discloses embossing only in the application of embossing metal. Tissue paper is not mentioned.

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Notwithstanding the Examiner's statement in the Office Action at the third line of paragraph 4, nowhere in the Rheingold disclosure does it indicate stippling as a production method. Following two thorough readings of the document, Applicant finds no instance of the word "stippling," nor do any phrases indicate that stippling is being performed.

Stippling as defined by Applicant's copy of The American Heritage Dictionary (1985, ISBN 0-395-32944-2) as "1. To draw, engrave, or paint in dots or short strokes. 2. To apply (paint for example) in dots or short strokes. 3. To dot, fleck, or speckle" also "1. The method of drawing, engraving, or painting by stippling. 2. The effect produced by stippling."

Neither does Applicant find any discussion which in any way implies that stippling is a desirable effect or procedure. On the contrary, it seems plain that the preferred end state is to provide a sheet metal part which has been removed from the sheet stock with as little damage as possible. If the sheet metal is mechanically stippled, or the resist coating is stippled onto the sheet metal, the etching chemical would be expected to eat away metal within the part resulting in undesirable pits or holes randomly placed within the manufactured part. The Rheingold disclosure at Col. 6, lines 62-72, "It is to be observed that in addition to eroding the surfaces of the peripheral crack between

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the part and the embryo opening in the stock for the purpose aforementioned, the etchant also will attack any other part of the stock or part which is unprotected by the resistant coating."

Applicant does not believe that the Rheingold reference is in any way relevant since the present invention in no way contemplates the separation of a visible portion of metal from the embossing roll body. Such separation of metal from the embossing roll body is neither required nor desirable for the present invention.

For the foregoing reasons, the rejection of Claims 10-11 under 35 U.S.C. §103(a) as unpatentable over Rheingold, U.S. Patent No. 5,620,776, is based on an improper combination of references and further on insufficient references and is respectfully requested to be withdrawn.

In the event the Examiner has further difficulties with the allowance of the present application, he is invited to contact the undersigned attorney for Applicants by telephone at (215) 794-9775 to resolve any remaining questions or issues by interview and/or Examiner's Amendment as to any matter which may expedite the completion of the prosecution of the application.


Attached hereto is a marked-up version of the changes made to the Claims by the current Amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

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Acceptance of the formal drawings is hereby acknowledged.

Reconsideration of this application is requested.

Respectfully submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

8. (Amended) An embossing roll for treating a paper product, comprising:
an embossing roll having a roughened surface in the form of protuberances or depressions sized [to break a minority of fiber to fiber bonds in a paper surface region of a paper product] such that a percentage of fiber-to-fiber bonds broken in a center 0.02mm thickness of a paper sheet is less than a percentage of the fiber-to-fiber bonds broken within 0.02mm of a paper surface of said paper sheet, wherein said protuberances or depressions are sized at less than about 0.1 mm.
21. (New) An embossing roll for treating a paper product, comprising:
an embossing roll having a roughened surface in the form of protuberances or depressions sized [to break a minority of fiber to fiber bonds in a paper surface region of a paper product] such that, the percentage of the fiber-to-fiber bonds which are broken in the center 0.02mm of the thickness of the paper sheet is less than the percentage of the fiber-to-fiber bonds which are broken within 0.02mm of either paper surface, wherein said protuberances or depressions are sized at less than about 0.1 mm.
22. (New) An embossing roll for treating a paper product, comprising:
an embossing roll having a roughened surface in the form of protuberances or depressions sized [to break a minority of fiber to fiber bonds in a paper surface region of a paper product] such that, the height of those embossing elements which are not used to form visually distinctive icons is less than $\frac{1}{2}$ the thickness of the paper sheet to be embossed, wherein said protuberances or depressions are sized at less than about 0.1 mm.